hemolytic effects. LOEB has shown that for the mono-alcohols the same law holds for induced positive heliotropism and for toxic effects in Copepida and Daphniidae.

CZAPEK describes a piece of apparatus by which one can determine quickly the surface tension of a solution. He studied the effects of alcohols (primary, secondary, and tertiary), esters, and urethanes upon the permeability of plant cells to certain solutes such as tannins and anthocyanins. Any aqueous solutions of these substances having a surface tension of 0.68 or 0.69 or less (water considered as unity) rendered the plant cells permeable to the contained solutes. The material studied was leaf cells of *Echeveria*, petiole hairs of *Saxifraga sarmentosa*, petals of *Paeonia*, leaf epidermis of *Tradescantia*, etc. CZAPEK believes that the surface tension of the *Plasmahaut* of the cells used is a little more than 0.68 or 0.69, and that as soon as the surface tension of the surrounding solution is somewhat lower, the solutes in the cell begin to pass out. By this means, he states, the surface tension of the *Plasmahaut* can be measured, just as osmotic pressure can be measured, by the use of the ordinary plasmolytic agents. He believes that the *Plasmahaut* is an emulsion of neutral fats. An aqueous emulsion of fats gives a surface tension of 0.68 or 0.69. Lecithin and cholasterin give lower surface tensions and are assumed not to play any rôle in the *Plasmahauten* studied.

CZAPEK emphasizes the fact that permeability is often modified by agents that lower the surface tension but slightly if any, as weak solutions of acids, chloroform, chloral hydrate, etc. This cannot be explained, of course, on the basis of lowered surface tension of the solution. He believes that in the case of acids it is due to the saponifying action of the acid on the fat of the *Plasmahaut.*

On the whole, the article confirms TRAUBE'S surface tension theory of osmotic movements of solutions through plant and animal membranes. This theory assumes that the movement of the solutions is in the direction of the lower surface tension.—WILLIAM CROCKER.

Alternative inheritance in elm seedlings.—There are two species of elm in England, *Ulmus montana* and *U. glabra*, both called "Wych-elm," and numerous cultivated varieties of unknown origin which are planted about English hedgerows and parks. Several of these latter are so distinct as to have received specific names, but HENRY[12] finds, as the result of sowing 90 different lots of elm seeds in 1909, that only the two species above named breed true. The seedlings of *Ulmus glabra* have a stiff, erect, unbranched stem with small leaves which are opposite throughout the first season's growth; while *U. montana* has the unbranched stem drooping to one side and only its first two leaves opposite, the rest alternate, the leaves being larger and with longer petioles. All the cultivated varieties of elm tested gave mixtures of seedlings

[12] HENRY, AUGUSTINE, On elm-seedlings showing Mendelian results. Jour. Linn. Soc. Bot. **39**: 290–300. *pls. 5.* 1910.

of these two types with respect to the arrangement of the leaves. The Huntingdon elm (*U. vegeta*), commonly believed to be a hydrid, produced 732 opposite-leaved seedlings and 239 alternate-leaved, the expected Mendelian result if the Huntingdon elm is an F_1 hybrid between *U. glabra* and *U. montana*. Other ratios given by different varieties were 245:95 and 310:84, when the parent trees had grown in such situations that their pollination was probably effected by pollen from the same variety. The progeny of a "Jersey" elm, which was probably pollinated by *U. montana*, consisted of 17 opposite-leaved and 19 alternate-leaved, equality probably being "expected." The "English" elm (*U. campestris*) is also an undoubted hybrid, but this rarely produces fertile seeds, though an abundance of samarae are produced; 19 boxes of seeds of the English elm gave no germinations. This sterility and also the appearance of many imperfect flowers in the various cultivated varieties are accepted by the author as additional evidences of hybridity. The author believes that the varieties produced in genera having a number of species are of fundamentally different nature from those in genera including a single species. In birch, oak, lime, poplar, and willow, as in elm, the varieties are hardly to be distinguished from distinct species except by breeding tests. They are generally the result of hybridization, while in the beech and the ash, each of which is represented in northern Europe by a single species, the numerous varieties are of the nature of "sports," whose relationship and varietal value are recognized at once, as in the case of cut-leaved, purple-leaved, weeping varieties, etc.—GEO. H. SHULL.

Geotropism.—ZIELENSKI,[13] working in JOST'S laboratory, has made accurate determinations of presentation, reaction, and critical times, and of the relaxation index in geotropism, using the roots of *Lupinus albus* and *Lepidium sativum*. Use of the clinostat and horizontal microscope renders his methods delicate and accurate, and the paper has the appearance of a real contribution. "Reaction time" is the period (under continual exposure) from the beginning of horizontal placement to the beginning of curvature. "Presentation time" is the least continual horizontal exposure necessary to give curvature at some later time (the organ is on an equally rotating horizontal clinostat from end of exposure to beginning of reaction). "Critical time" is the least exposure that is not entirely nulled by an opposite and immediately following exposure of equal length (organs are on a horizontal equally rotating clinostat after the second exposure). "Relaxation index" is the ratio of the length of the equal individual rotation periods to the length of equal individual exposures (shorter than presentation time), that will not result in summation. Reaction, presentation, and critical times were determined

[13] ZIELENSKI, FELIX, Ueber die gegenseitige Abhängigkeit geotropischer Reizemomente. Zeitschr. Bot. **3**:81–101. 1911.